STATE OF NEW YORK
NEW YORK STATE SCHOOL FOR THE BLIND
RICHMOND AVENUE
BATAVIA, N.Y. 14020
PHONE: (716) 343-5384 OR 343-5385

Dear Sir or Madame,

Please forgive the delay in sending you the information you requested on the construction of the co-pilot cane teaching aid.

The original plans were accompanied by a series of photographs illustrating each step in the construction and assembly of the teaching aid. This made it easier to understand each step of the construction, and the progression from raw material to finished product. Since it is not economically possible to reproduce and send out these pictures, I will make some extra notations on the plan sheets to make them easier to understand, and I hope make it easier to complete the project. I have also enclosed a brief explanation of the design, development, and use we are making of the device, as well as the plan sheets, and a bill of materials.

Thanks for your interest in the device , and if I can be of any further assistance, please don't hesitate to contact me.

Sincerely,

Chuck Canterbury

INTRODUCTION

The teaching aid, referred to as the co-pilot cane device, is intended for use with multiply impaired blind students. The development of the aid grew out of the need to work safely and more effectively with students who had poor communication skills, were sometimes physical abusive, and had difficulty generalizing learned skills. In addition, many of the students are not highly motivated to travel independently.

The device is simply a short piece of tubing which connects the student's cane with one being manipulated by the instructor, allowing the instructor to have limited control over the movement of the student's cane. By being able to move the student's cane, the teacher is able to demonstrate basic cane movements. This will minimize physical contact with the student, and reduce the dependence on communication skills for teaching the lesson. In addition, it will allow the teaching of various motor skills to occur while on basic mobility routes, when the skill is most appropriate, and have the most meaning to the student. Students who are reluctant to travel, due to fear, insecurity, or poor motivation also appear to be less resistive to cane travel when the device is used.

PRESENT APPLICATION OF THE TEACHING AID

Currently the device is being used for teaching arc width and staying in step with one's cane. In addition to these specific cane skills, it has been useful as a motivator for some students, and to correct/control some behavioral problems relating to safe and proper cane handling. The teaching aid may also be useful for demonstrating other skills, such as proper cane use when trailing with the cane, traversing openings, and locating dropoffs.

DESIGN AND CONSTRUCTION OF THE CO-PILOT CANE DEVICE

The original model was simply a piece of aluminum tubing with a long rubber band stretched through the center. The canes were connected by inserting their shafts through the loops formed by the rubber bands at each end of the tubing. The device worked well, but it was difficult to attach and detach from the canes. In addition to the inconvenience, the device could be dangerous should the tightly stretched rubber band come unattached, either accidentally, or due to breakage.

A number of pilot models have been built and tested since the original, using different materials ranging from PVC plastic pipe, to wooden dowel rods, solid aluminum rods, fiberglass tubing, and aluminum tubing, in an effort to determine which material would be best suited for the main body of the unit. The design of the tips, and the material used in their construction, have likewise undergone a series of experiments to decide on what would work best. After testing a number of materials and designs, and considering such factors as cost, durability, weight, convince, safety, and ease of construction, it was determined that the best overall design would incorporate a 1/2" O.D. aluminum tube for the body, with polycarbonate plastic tips, and mini stretch cords as the fastening/tensioning device. The cost of material would then be around $7.00 per cane device. Construction of the teaching aid is simple, but does require the use of several machines, such as a drill press, and a wood or metal lathe. The required machines can usually be found in any high school wood or metal shop. In addition to this, one specialized hand tool is used to fasten, or crimp, the ends of the stretch cords, to fasten them into the plastic tips. The tool is called a buchanan pres-sure-tool, and it is used in the electrical trades to crimp the bare ends of electrical wires together.

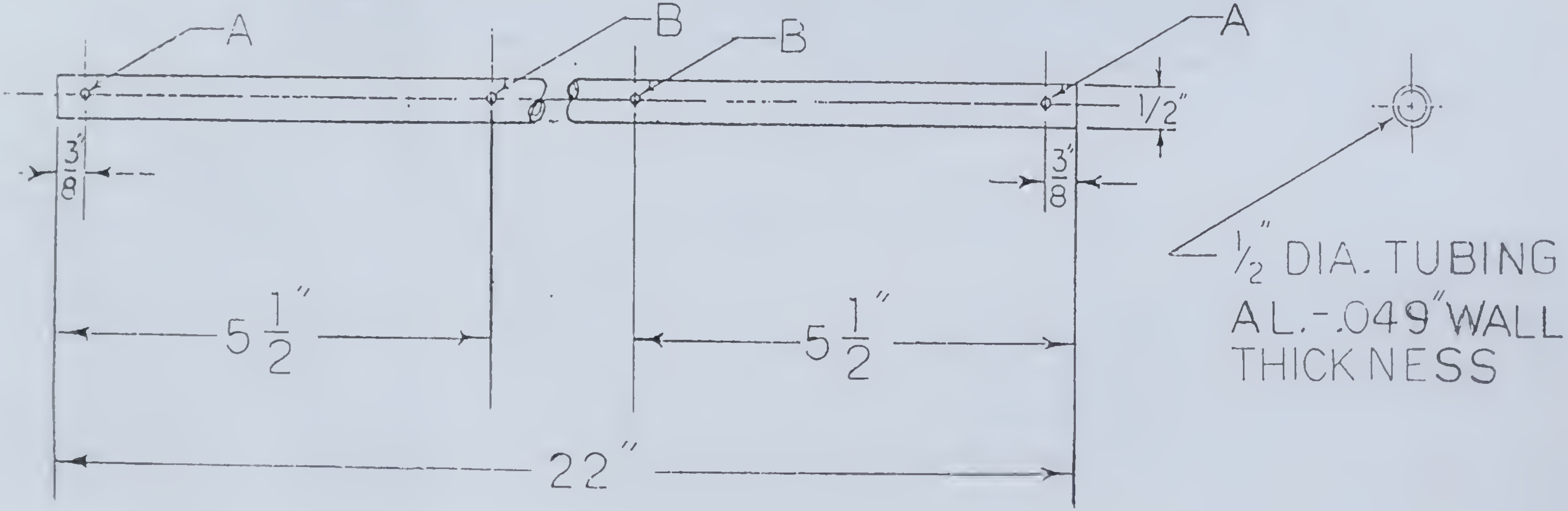
Individuals working in most public school systems should be able to secure the aid and advice of a competent industrial arts, or vocational teacher, who could provide access to the tools and equipment, and possibly a student from his or her class to actually construct the teaching aid.

#1.

NOTE

A-DRILL TO FIT $\frac{1}{8}$"X $\frac{1}{2}$" ROLL PIN

B-DRILL TO FIT $\frac{3}{4}$"X 10-24 THUMB SCREWS - THE THUMB SCREWS TO HAVE A $\frac{1}{8}$" HOLE DRILLED IN THE TOP TO ACCEPT STRETCH CORD HOOK



$\frac{1}{2}$" SCALE

TUBING FOR CO-PILOT CANE DEVICE 1 REQ.

Notations for Plan Sheet #1

Aluminum Shaft or Body

The shaft of the device is made from scrap pieces of aluminum tubing which are left over from making canes. Follow the plan sheet to cut and drill the tubing as indicated.

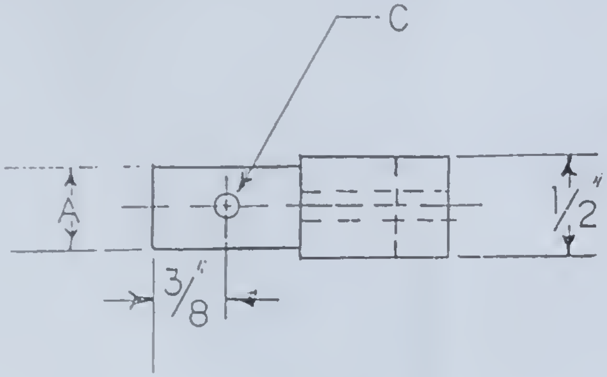
Note: B on plan sheet #1. This refers to two thumb screws which are used to secure the hooks on the end of the elastic stretch cords. Holes, of about 1/8", must be drilled in the top (flat area) of the thumb screws to allow the ends of the hooks to be secured through the holes.

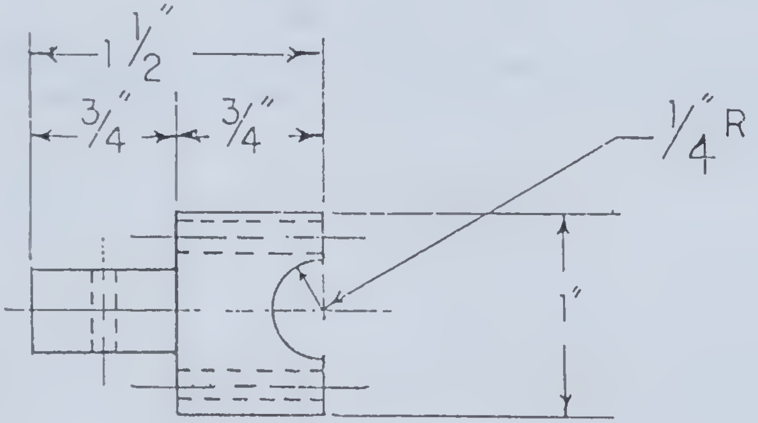
#2

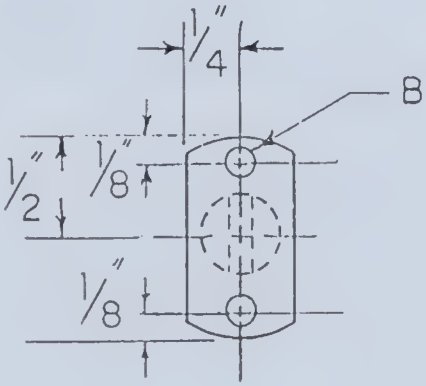
NOTE

A- TO FIT INTO AL. TUBING
B- TO FIT MINI STRETCH CORD
$\frac{5}{32}$" DIA.
C- TO FIT A $\frac{1}{8}$" X $\frac{1}{2}$" ROLL PIN

MACHINE FROM 1" DIA.
POLYCARBONATE RESIN







FULL SCALE

TIP FOR CO-PILOT CANE DEVICE - MACHINE 2 PARTS

Notations for Plan Sheet #2

Machining of Plastic Tips

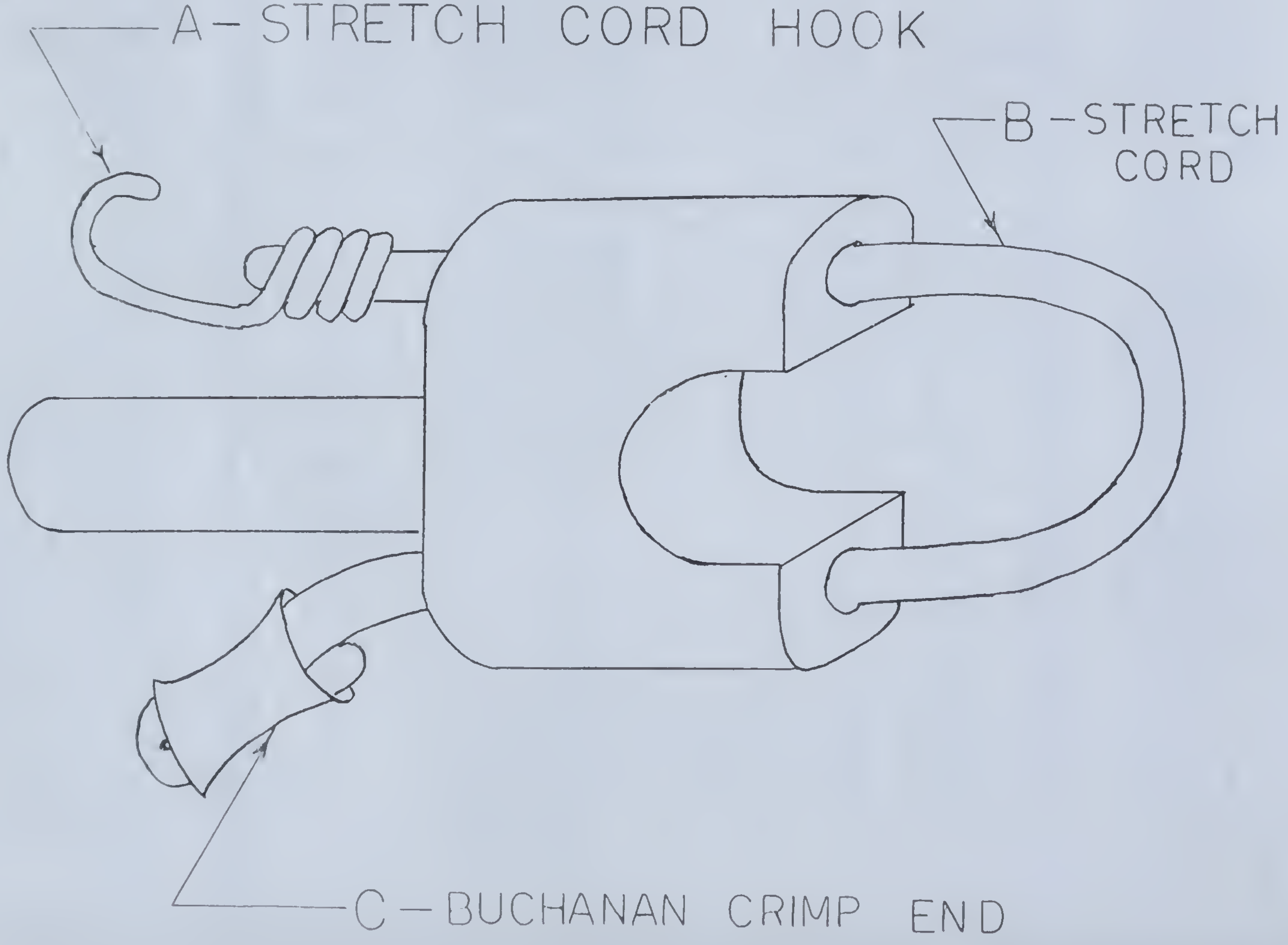
I have been using 1" diameter stock, but you may want to increase this to 1 1/8" to make is easier to drill the holes for the stretch cords. If you use 1" stock you must be very accurate in drilling the holes or the drill will break through and come out the side of the tip.

The 1/4" radius shown of the plan sheet should be increased slightly to allow for padding to be glued on and thereby reducing the chance of marring the finish on your student's canes. I have been using a material called moleskin (purchased in any drugstore,) but thin leather or felt also works well.

Another suggestion for preventing the device from marring the finish on the cane is to sand or file the sharp edges of the tips so they are slightly rounded.

#3.

POLYCARBONATE TIP ASSEMBLY



Notations for Plan Sheet #3

Assembly of Plastic Tip

One mini stretch cord is used in the assembly of the two plastic tips. I purchased the stretch cords at camping supply stores. They measure 3/16" x 10", and come with a metal hook secured to each end. The stretch cord is cut in half and one piece is used for one tip and the remaining piece for the other. The cut end is pushed through the holes as shown in the drawing. Make sure the holes are large enough to push them through without unraveling.

The cut end of the cord is doubled over and pulled through a brass ring called a buchanan crimp end. Once the ring is in place, it is crushed in place using a crimping tool called a buchanan crimper. This crimper and the crimp ends are used to make electrical (wire) connections, so purchase them from an electrical supplier, or just borrow it from your local electrician.

When I pull the end of the stretch cord through the crimp end I use a wire (paper clip) with a loop bent in the end, and I pull the cord through so the cut end is just barely sticking out of one side and the loop is just sticking out of the other side of the crimp end (see drawing.) Once you have the end in the proper position (doubled over and pulled through the crimp end,) use the crimper to crush the crimp end in place permanently fastening the stretch cords in place.

To complete the assembly of the co-pilot cane teaching aid.

1. If reflective tape is to be used on the aluminum shaft, it must be put on at this time. I use it so the device will be more visible.

2. Insert the thumbscrews into the proper holes and secure them in place so the flat parts are on the same side of the shaft.

3. Insert the plastic tips into the ends of the shaft so the stretch cord hooks are on the same side as the flat part of the thumbscrews. Secure the tips by taping the tension pins through the hole in the shaft and tips using a hammer. Tap them into the holes until the ends of the pins are even with both sides of the shaft.

COST OF CONSTRUCTING THE CO-PILOT CANE DEVICE				
Part Name or Description	Material	Cost/Unit	Needed Material	Total Cost
shaft	aluminum tubing 1/2" O.D.	$1.50/ft.	1 piece 22"long	$2.75
tips	polycarbonate rod 1" dia.	$5.40/ft.	1 piece 3"long	$1.35
mini stretch cords	---------	$1.69/4	1 piece 3/16"X10"	$0.43
reflective tape	---------	$0.085/in.	1 3/4"X 22"long	$1.87
thumb screws #10-24X3/4"	---------	$0.18/ea.	2 pieces	$0.36
lock nuts #10-24	---------	$0.09/ea.	2 pieces	$0.18
tension pins 1/8"X3/4"	---------	$0.06/ea.	2 pieces	$0.12
buchanan crimp ends	---------	$0.06/ea.	2 pieces	$0.12
padding	---------	--------	--------	-----
Total Cost for Co-Pilot Cane Device				$7.18